IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: GROUP: 1712

Klaus SCHULTES, et al.

SERIAL NO: 10/502,057 EXAMINER: MOORE

FILED: October 28, 2004

FOR: IMPACT-RESISTANT MOLDING MATERIALS AND MOLDINGS

APPEAL BRIEF

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

This is an appeal from the Examiner's Final Rejection dated May 10, 2006, of Claims 1, 2 and 4-16. A Notice of Appeal and Request for Pre-Appeal Brief Review were filed on July 31, 2006. The Notice of Panel Decision from Pre-Appeal Brief Review was mailed by the Patent Office on September 23, 2006. A Request for a one-month extension of time is filed herewith.

I. REAL PARTY IN INTEREST

The real party in interest is Roehm GmbH & Co. KG of Darmstadt, Germany, by virtue of the assignment recorded October 28, 2004, at Reel/Frame 015938/0622.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants' legal representative and their assignee are not aware of any other appeals or interferences which will directly affect or be directly affected by or having a

bearing on the Board's decision in this appeal.

III. STATUS OF THE CLAIMS

The appealed claims are Claims 1, 2 and 4-16.

IV. STATUS OF THE AMENDMENT

No Amendment under 37 C.F.R. §1.116 was filed.

V. SUMMARY OF THE OF THE CLAIMED SUBJECT MATTER

As claimed in Claim 1, the present invention relates to an impact-resistant molding material comprising

poly(meth)acrylate and

at least one silicone rubber graft copolymer comprising

from 0.05 to 95% by weight, based on the total weight of the copolymer, of a core a) comprising an organosilicon polymer which has the general formula $(R_2SiO_{2/2})_x \cdot (RSiO_{3/2})_y \cdot (SiO_{4/2})_z$ where x = from 0 to 99.5 mol%, y = from 0.5 to 100 mol%, z = from 0 to 50 mol%, where R means identical or different alkyl or alkenyl radicals having from 1 to 6 carbon atoms, aryl radicals; or substituted hydrocarbon radicals,

from 0 to 94.5% by weight, based on the total weight of the copolymer, of a polydialkylsiloxane layer b), and

from 5 to 95% by weight, based on the total weight of the copolymer, of a shell c) comprising organic polymers, wherein the core a) encompasses vinyl groups prior to the grafting process, and the shell c) is obtained via free-radical polymerization of a mixture in which acrylic esters and methacrylates are present,

wherein the ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) is in the range from 50:50 to 1:99.

See page 5, lines 14-37 and page 13, last paragraph, of the specification.

VI. GROUNDS OF REJECTION

(A) Claims 1, 2, and 4-16 stand rejected under 35 U.S.C. § 103(a) over Geck et al and Mautner et al.

(B) Claims 1, 2 and 4-16 stand provisionally rejected on the ground of obviousness-type double patenting as being unpatentable over claims 18-25 of copending application Serial No. 10/501, 467.

VII. ARGUMENT

Ground (A)

Claims 1, 2, and 4-16 stand rejected under 35 U.S.C. § 103(a) over Geck et al and Mautner et al. That rejection is untenable and should not be sustained.

Claim 1

The present invention as set forth in **Claim 1** relates to an impact-resistant molding material comprising

poly(meth)acrylate and

at least one silicone rubber graft copolymer comprising

from 0.05 to 95% by weight, based on the total weight of the copolymer, of a core a) comprising an organosilicon polymer which has the general formula $(R_2SiO_{2/2})_x \cdot (RSiO_{3/2})_y \cdot (SiO_{4/2})_z$ where x = from 0 to 99.5 mol%, y = from 0.5 to 100 mol%, z = from 0 to 50 mol%, where R means identical or different alkyl or alkenyl radicals having from 1 to 6 carbon atoms, aryl radicals, or substituted hydrocarbon radicals,

from 0 to 94.5% by weight, based on the total weight of the copolymer, of a polydialkylsiloxane layer b), and

from 5 to 95% by weight, based on the total weight of the copolymer, of a shell c) comprising organic polymers, wherein the core a) encompasses vinyl groups prior to the grafting process, and the shell c) is obtained via free-radical polymerization of a mixture in which acrylic esters and methacrylates are present,

wherein the ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) is in the range from 50:50 to 1:99.

Claims 2 and 4-16 depend on Claim 1.

Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material as claimed comprising **PMMA** and in which the at least one silicone rubber graft copolymer comprises from 5 to 95% by weight, based on the total weight of the copolymer, of a shell c) comprising organic polymers, wherein the core a) encompasses vinyl groups prior to the grafting process, and the shell c) is obtained via free-radical polymerization of a mixture in which acrylic esters and methacrylates are present, wherein the ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) is in the range from **50:50 to 1:99**.

Geck et al disclose another type of elastomeric particles which are pre-crosslinked. See col. 2, lines 41and 58-59. The particles are used to modify **coatings** and not molding materials as claimed. See col. 2, lines 43 and 56-57. The ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) in the range from **50:50 to 1:99** is not disclosed in Geck et al.

Mautner et al describe the composition and process of preparation of elastomeric particles. See col. 2, starting at line 64. However, the notched impact strength of the particles is very low compared to that of the present invention (see Tables below) because the ratio by

weight of acrylic ester to methacrylate in the mixture for preparing the shell c) in the range from **50:50 to 1:99** is not disclosed in Geck et al.

The Examples in the specification describe the superior properties of the present invention as follows in Tables 4 and 5 at pages 23-29 of the specification.

Table 4

	Inventive example 1	Comparative example 1	Comparative example 2
Die swell [%]	22.7	15.4	26.7
Viscosity η_s (220°C/5 MPa) [Pa s]	2180	2447	2075
Mini-Vicat [°C]	100.5	99.1	98.7
Izod NIS [kJ/m^2]			
23°C	5.6	3.22	5.25
-20°C	5.0	2.88	4.18
-40°C	4.4		
Modulus of elasticity [MPa]	2320	2129	2277

Table 4: Continuation

	Inventive example 2	Inventive example 3	Inventive example 4
Die swell [%]			
MVR (230°C/3.8 kg) [cm^3/10 min]	2.25	1.94	2.45
Mini-Vicat [°C]	101.0	100.6	100.9
Izod NIS [kJ/m^2]			
23°C	6.4	5.7	6.1
-20°C	5.4	4.5	5.3
Modulus of elasticity [MPa]			

Table 4: Continuation

	Inventive example 5
Die swell [%]	
MVR [cm^3/10 min]	1.7
Mini-Vicat [°C]	100.8
Izod NIS [kJ/m^2]	
23°C	6.3
-20°C	4.9
Modulus of elasticity [MPa]	

From the data set out in Table 4 it can be seen that modifiers obtainable by grafting a shell comprising a mixture in which acrylic esters and methacrylates are present onto a vinyl-containing core can give an **excellent improvement in the impact resistance of PMMA** molding materials.

Table 5

	Inventive example 1	Comparative example 3	Inventive example 6
Die swell [%]	22.7	25	19.8
Viscosity η_s (220°C/5 MPa) [Pa s]	2180	1930	2380
Mini-Vicat [°C]	100.5	100	100
Izod NIS [kJ/m^2]			
23°C	5.6	4.3	6.4
Modulus of elasticity [MPa]	2320	2400	2200

Table 5 shows that mixtures of acrylate rubber modifiers with silicone rubber modifiers have superior impact resistance values at room temperature. The selection of the mixtures was

such that their softening point was similar. This improvement in impact resistance values at room temperature is attributable to unforeseeable synergy.

These superior results are not disclosed or suggested by Geck et al and Mautner et al, alone or in combination.

Claim 2

Claim 2 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material in which the ratio by weight of core a) and layer b) to the shell c) is in the range from 70:30 to 55:65. Thus, the impact-resistant molding material of Claim 2 is not disclosed or suggested.

Claim 4

Claim 4 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material in which the molding material comprises at least 55% by weight of poly(meth)acrylates, based on the total weight. Thus, the impact-resistant molding material of Claim 4 is not disclosed or suggested.

Claim 5

Claim 5 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material in which the molding material comprises at least one acrylate-rubber impact modifier. Thus, the impact-resistant molding material of Claim 5 is not disclosed or suggested.

Claim 6

Claim 6 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material in which the particle diameter of the acrylate-rubber impact modifier is in the range from 50 to 1000 nm. Thus, the impact-resistant molding material of Claim 6 is not disclosed or suggested.

Claim 7

Claim 7 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material which it comprises styrene-acrylo-nitrile polymers. Thus, the impact-resistant molding material of Claim 7 is not disclosed or suggested.

Claim 8

Claim 8 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material which comprises styrene-acrylo-nitrile polymers which were obtained via polymerization of a mixture which comprises

from 70 to 92% by weight of styrene

from 8 to 30% by weight of acrylonitrile, and

from 0 to 22% by weight of other comonomers, based in each case on the total weight of the monomers to be polymerized. Thus, the impact-resistant molding material of Claim 8 is not disclosed or suggested.

Claim 9

Claim 9 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material which comprises

f1) from 20 to 95% by weight of (meth)acrylate polymers,

f2) from 0 to 45% by weight of styrene-acrylonitrile polymers,

f3) from 5 to 60% by weight of silicone rubber graft copolymers,

f4) from 0 to 60% by weight of acrylate-rubber impact modifier, based in each case on the weight of components f1-f4, and conventional additives. Thus, the impact-resistant molding material of Claim 9 is not disclosed or suggested.

Claim 10

Claim 10 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material in which the silicone rubber graft copolymers have a particle diameter in the range from 10 to 300 nm. Thus, the impact-resistant molding material of Claim 10 is not disclosed or suggested.

Claim 11

Claim 11 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material in which the shell c) was obtained via polymerization of a mixture in which methyl methacrylate and acrylic ester having from 1 to 8 carbon atoms are present. Thus, the impact-resistant molding material of Claim 11 is not disclosed or suggested.

Claim 12

Claim 12 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material in which the acrylic ester is selected from the group consisting of ethyl acrylate, butyl acrylate, and mixtures thereof. Thus, the impact-resistant molding material of Claim 12 is not disclosed or suggested.

Claim 13

Claim 13 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant molding material in which the content of vinyl groups in the core a) is in the range from 2 to 3 mol%, based on the weight of the core. Thus, the impact-resistant molding material of Claim 13 is not disclosed or suggested.

Claim 14

Claim 14 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant **molding** obtained via extrusion or injection molding of a molding material as claimed in claim 1. Thus, the impact-resistant molding of Claim 14 is not disclosed or suggested.

Claim 15

Claim 15 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant **molding** in which the molding has a Vicat softening point to ISO 306 (B50) of at least 85°C, a notched impact strength NIS (Izod 180/1eA, 1.8 MPa) to ISO 180 of at least 3.0 kJ/m^2 at -20°C and of at least 2.5 kJ/m^2 at -40°C, a modulus of elasticity to ISO 527-2 of at least 1500 MPa. Thus, the impact-resistant molding of Claim 15 is not disclosed or suggested.

Claim 16

Claim 16 is separately patentable because Geck et al and Mautner et al fail to disclose or suggest an impact-resistant **molding** which is a mirror housing or a spoiler for a vehicle, or is a pipe, or a protective cover, or a component of a refrigerator. Thus, the impact-resistant molding of Claim 16 is not disclosed or suggested.

Thus, Claims 1, 2, and 4-16 are Not Obvious over Geck et al and Mautner et al within the meaning of 35 U.S.C. §103(a). For all the above reasons, it is respectfully requested that this rejection be REVERSED.

Ground (B)

Claims 1, 2 and 4-16 stand provisionally rejected on the ground of obviousness-type double patenting as being unpatentable over claims 18-25 of copending application Serial No.10/501, 467. That rejection should not be sustained.

MPEP 822.01 provides instructions regarding provisional double patenting rejections. Since Serial No.10/501, 467 has not yet issued as a patent, Applicants request the Examiner to withdraw the **provisional double patenting** rejection if it is the only issue remaining in one case and convert the provisional rejection in the other application to a double patenting rejection. MPEP 822.01.

For all the above reasons, it is respectfully requested that this rejection be REVERSED.

VIII. CONCLUSION

For the above reasons, it is respectfully requested that all the rejections still pending in the Final Office Action be REVERSED.

Respectfully submitted,

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CLAIMS APPENDIX

Claim 1 (Previously Presented): An impact-resistant molding material comprising

poly(meth)acrylate and

at least one silicone rubber graft copolymer comprising

from 0.05 to 95% by weight, based on the total weight of the copolymer, of a core a) comprising an organosilicon polymer which has the general formula $(R_2SiO_{2/2})_x \cdot (RSiO_{3/2})_y \cdot (SiO_{4/2})_z$ where x = from 0 to 99.5 mol%, y = from 0.5 to 100 mol%, z = from 0 to 50 mol%, where R means identical or different alkyl or alkenyl radicals having from 1 to 6 carbon atoms, aryl radicals, or substituted hydrocarbon radicals,

from 0 to 94.5% by weight, based on the total weight of the copolymer, of a polydialkylsiloxane layer b), and

from 5 to 95% by weight, based on the total weight of the copolymer, of a shell c) comprising organic polymers, wherein the core a) encompasses vinyl groups prior to the grafting process, and the shell c) is obtained via free-radical polymerization of a mixture in which acrylic esters and methacrylates are present,

wherein the ratio by weight of acrylic ester to methacrylate in the mixture for preparing the shell c) is in the range from 50:50 to 1:99.

Claim 2 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein the ratio by weight of core a) and layer b) to the shell c) is in the range from 70:30 to 55:65.

Claim 3 (Canceled):

Claim 4 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein the molding material comprises at least 55% by weight of poly(meth)acrylates, based on the total weight.

Claim 5 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein the molding material comprises at least one acrylate-rubber impact modifier.

Claim 6 (Previously Presented): The impact-resistant molding material as claimed in claim 5, wherein the particle diameter of the acrylate-rubber impact modifier is in the range from 50 to 1000 nm.

Claim 7 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein it comprises styrene-acrylo-nitrile polymers.

Claim 8 (Previously Presented): The impact-resistant molding material as claimed in claim 7, wherein the styrene-acrylonitrile polymers were obtained via polymerization of a mixture which comprises

from 70 to 92% by weight of styrene

from 8 to 30% by weight of acrylonitrile, and

from 0 to 22% by weight of other comonomers, based in each case on the total weight of the monomers to be polymerized.

Claim 9 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein the molding material comprises

fl) from 20 to 95% by weight of (meth)acrylate polymers,

f2) from 0 to 45% by weight of styrene-acrylonitrile polymers,

f3) from 5 to 60% by weight of silicone rubber graft copolymers,

f4) from 0 to 60% by weight of acrylate-rubber impact modifier, based in each case on the weight of components f1-f4, and conventional additives.

Claim 10 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein the silicone rubber graft copolymers have a particle diameter in the range from 10 to 300 nm.

Claim 11 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein the shell c) was obtained via polymerization of a mixture in which methyl methacrylate and acrylic ester having from 1 to 8 carbon atoms are present.

Claim 12 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein the acrylic ester is selected from the group consisting of ethyl acrylate, butyl acrylate, and mixtures thereof.

Claim 13 (Previously Presented): The impact-resistant molding material as claimed in claim 1, wherein the content of vinyl groups in the core a) is in the range from 2 to 3 mol%, based on the weight of the core.

Claim 14 (Previously Presented): An impact-resistant molding obtained via extrusion or injection molding of a molding material as claimed in claim 1.

Claim 15 (Previously Presented): The impact-resistant molding as claimed in claim 14,

wherein the molding has a Vicat softening point to ISO 306 (B50) of at least 85°C, a notched impact strength NIS (Izod 180/1eA, 1.8 MPa) to ISO 180 of at least 3.0 kJ/m^2 at -20°C and of at least 2.5 kJ/m^2 at -40°C, a modulus of elasticity to ISO 527-2 of at least 1500 MPa.

Claim 16 (Previously Presented): The impact-resistant molding as claimed in claim 14, wherein the molding is a mirror housing or a spoiler for a vehicle, or is a pipe, or a protective cover, or a component of a refrigerator.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.